

Amendment

IN THE CLAIMS:

1. (Currently Amended) A plasma processing apparatus for applying a plasma process to an object to be processed, the plasma processing apparatus comprising:
 - a process chamber in which the object to be processed is subjected to the plasma process;
 - an inlet port from which a reactant gas is introduced;
 - an annular gas passage connected to said inlet port, said annular gas passage having a plurality of nozzles through which the reactant gas is introduced into said process chamber;
 - a valve disposed between said inlet port and said annular gas passage;
 - a first vacuum pump connected to said process chamber so as to evacuate gas from said process chamber so that said process chamber is maintained at a negative pressure;
 - an outlet port provided to said annular gas passage, said outlet port being spaced apart from said inlet port; and
 - a second vacuum pump connected to said outlet port so as to evacuate the reactant gas from said annular gas passage.
2. – 3. (Canceled)
4. (Previously Presented) The plasma processing apparatus as claimed in claim 1, wherein said annular gas passage is incorporated into a sidewall of said process chamber.
5. (Canceled)
6. (Previously Presented) The plasma processing apparatus as claimed in claim 1, further comprising a dielectric plate and a shower plate provided on a top of said process chamber so as to introduce the reactant gas from the top of said process chamber, a gas passage being formed between said dielectric plate and said shower plate so that the reactant gas flows through the gas passage and is introduced into said process chamber through said shower plate.
7. (Previously Presented) The plasma processing apparatus as claimed in claim 6, wherein said dielectric plate has an inlet port connected to said gas passage so as to supply

Amendment

the reactant gas to said gas passage, and said gas passage has an outlet port to which said second vacuum pump is connected.

8. (Original) The plasma processing apparatus as claimed in claim 6, further comprising a slot antenna having a plurality of slits so as to guide a microwave having a predetermined frequency which is determined by the plasma process to be applied to the object to be processed.

9. (Original) The plasma processing apparatus as claimed in claim 8, wherein a density of the slits is substantially uniform in a radial direction of said slot antenna.

10. (Withdrawn) A gas supply ring adapted to introduce a reactant gas into a process chamber of a processing apparatus, the gas supply ring comprising:

a plurality of circumferentially arranged nozzles through which the reactant gas is introduced into said process chamber;

at least one inlet port from which the reactant gas is supplied;

an annular gas passage connected to said inlet port so that the reactant gas supplied from the inlet port is supplied to said plurality of nozzles by flowing through said annular gas passage; and

an outlet port provided to said annular gas passage so that the reactant gas is evacuated from said gas supply ring through said outlet port.

11. (Withdrawn) A dielectric plate adapted to be attached to a process chamber of a plasma processing apparatus, the dielectric plate comprising:

a plurality of nozzles through which a reactant gas is introduced into said process chamber;

at least one inlet port from which the reactant gas is supplied;

a gas passage connected to said inlet port so that the reactant gas supplied from the inlet port is supplied to said plurality of nozzles by flowing through said gas passage ; and

and outlet port provided to said gas passage so that the reactant gas is evacuated from said gas passage through said outlet port.

Amendment

12. (Withdrawn) A plasma processing method comprising the steps of:
- evacuating gas from a process chamber by a first vacuum pump connected to said process chamber;
 - introducing a reactant gas into said process chamber through a gas-introducing part;
 - applying a plasma process to an object placed in said process chamber by generating plasma from the reactant gas;
 - stopping the introduction of the reactant gas into said process chamber after ending the plasma process; and
 - evacuating the reactant gas remaining in said gas-introducing part by a second vacuum pump connected to said gas-introducing part.
13. (Withdrawn) A plasma processing method comprising the steps of:
- evacuating gas from a process chamber by a vacuum pump connected to said process chamber;
 - introducing a reactant gas into said process chamber through a gas-introducing part having a plurality of nozzles;
 - applying a plasma process to an object placed in said process chamber by generating plasma from the reactant gas;
 - stopping the introduction of the reactant gas into said process chamber after ending the plasma process; and
 - evacuating the reactant gas remaining in said gas-introducing part by said vacuum pump by connecting said gas-introducing part to said vacuum pump by bypassing said process chamber.
14. (Currently Amended) A plasma processing apparatus for applying a plasma process to an object to be processed, the plasma processing apparatus comprising:
- a process chamber in which the object to be processed is subjected to the plasma process;
 - an inlet port from which a reactant gas is introduced;
 - an annular gas passage connected to said inlet port, said annular gas passage having a plurality of nozzles through which the reactant gas is introduced into said process chamber;
 - a valve disposed between said inlet port and said annular gas passage;

Amendment

an outlet port provided to said annular gas passage, said outlet port being spaced apart from said inlet port;

a first vacuum pump connected to said process chamber so as to evacuate gas from said process chamber so that said process chamber is maintained at a negative pressure; and

a gas-evacuating arrangement connected to said outlet port so as to evacuate the reactant gas from said annular gas passage,

wherein said gas-evacuating arrangement comprises a bypass passage which connects said outlet port to said first vacuum pump by bypassing said process chamber.

15. (Previously Presented) The plasma processing apparatus as claimed in claim 14, wherein said annular gas passage is incorporated into a sidewall of said process chamber.

16. (Canceled)

17. (Previously Presented) The plasma processing apparatus as claimed in claim 14, further comprising a dielectric plate and a shower plate provided on a top of said process chamber so as to introduce the reactant gas from the top of said process chamber, a gas passage being formed between said dielectric plate and said shower plate so that the reactant gas flows through the gas passage and is introduced into said process chamber through said shower plate.

18. (Previously Presented) The plasma processing apparatus as claimed in claim 17, wherein said dielectric plate has an inlet port connected to said gas passage so as to supply the reactant gas to said gas passage, and said gas passage has an outlet port to which said gas-evacuating arrangement is connected.

19. (Previously Presented) The plasma processing apparatus as claimed in claim 14, further comprising a slot antenna having a plurality of slits so as to guide a microwave having a predetermined frequency which is determined by the plasma process to be applied to the object to be processed.

20. (Previously Presented) The plasma processing apparatus as claimed in claim 19, wherein a density of the slits is substantially uniform in a radial direction of said slot antenna.

21. (Previously Presented) The plasma processing apparatus as claimed in claim 1, further comprising:

a gas-injecting part connected to said process chamber so as to inject a discharge gas into said process chamber; and

a third vacuum pump connected to said gas-injecting part so as to evacuate the discharge gas from said gas-injecting part.

22. (Previously Presented) The plasma processing apparatus as claimed in claim 21, wherein said gas-injecting part has an annular shape and is incorporated into a sidewall of said process chamber above or below said gas-introducing part, said gas-injecting part has a plurality of circumferentially arranged nozzles through which the discharge gas is introduced into said process chamber.

23. (Previously Presented) The plasma processing apparatus as claimed in claim 22, wherein said gas-injecting part comprises:

at least one inlet port from which the discharge gas is supplied;

an annular gas passage connected to said inlet port so that the discharge gas supplied from the inlet port is supplied to said plurality of nozzles by flowing through said annular gas passage; and

an outlet port provided to said annular gas passage so that said third vacuum pump is connected thereto.

24. (Previously Presented) The plasma processing apparatus as claimed in claim 21, wherein said discharge gas includes a mixture of gas produced by adding N₂ and H₂ to at least one of neon, xenon, argon, helium, radon and krypton.

25. (Previously Presented) The plasma processing apparatus as claimed in claim 21, wherein said reactant gas includes a gas selected from the group consisting of NH₃, SiH₄, Cl₂, HCl, HF, BF₃, SiF₃, GeH₃, AsH₃, PH₃, C₂H₂, C₃H₈, SF₆, CCl₂F₂, CF₄, H₂S, CCl₄, BCl₃, PCl₃, SiCl₄.